

Atty. Docket No.: CA1469 (HAL 200)
PATENT APPLICATION

AMENDMENT UNDER 37 C.F.R. § 1.114(c)
U.S. Application No.: 09/996,308

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. *(Currently Amended)* A storage apparatus, comprising:

a processor;

a memory;

at least one storage device accessible over a network by at least one network entity;

a storage controller, coupled to the at least one storage device;

a network interface connectable to [[a]] the virtual local area network (VLAN) switch;

wherein the processor is at least intermittently coupled to the memory, the storage controller and the network interface;

wherein the memory comprises configuration information including a correspondence between at least one segment of a virtual local area network (VLAN) connectable by the network interface and at least one virtual volume of the at least one storage device; [[and]]

wherein the processor, the memory, the storage controller and the network interface are operable to control the virtual local area network (VLAN) switch to map the at least one segment to the at least one virtual volume based upon the configuration information; and

wherein at least one of the processor or the network interface control access to the at least one virtual volume based upon the configuration information.

2. *(Original)* The apparatus of claim 1,

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further comprising an out of band management interface connectable to a second network.

3. *(Original)* The apparatus of claim 1,
wherein the network interface connectable to a virtual local area network (VLAN) switch comprises an interface to a VLAN trunk line.

4. *(Original)* The apparatus of claim 3,
wherein information carried by the VLAN trunk line is identified using an embedded tag.

5. *(Previously Presented)* The apparatus of claim 1,
wherein the network interface connectable to a virtual local area network (VLAN) switch comprises an interface to a VLAN switch, the VLAN switch connectable to at least one host computer via at least one VLAN access link.

6. *(Previously Presented)* The apparatus of claim 5,
wherein information carried by the at least one VLAN access link comprises untagged frames.

7. *(Previously Presented)* The apparatus of claim 6,
wherein information carried by the at least one VLAN access link is identified using a VLAN Identifier of a receiving port.

8. *(Previously Presented)* The apparatus of claim 6,

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wherein information carried by the at least one VLAN access link is identified using a Media Access Control (MAC) address.

9. *(Original)* The apparatus of claim 6,

wherein an untagged frame comprises:

- a preamble field;
- a source MAC field;
- a destination MAC field;
- a type field;
- a data field; and
- a CRC field.

10. *(Currently Amended)* A method, comprising:

separating logically a local area network into a plurality of virtual local area networks, including a first virtual local area network and a second virtual local area network;

separating logically a storage device accessible over the local area network by at least one network entity into a plurality of virtual volumes, including a first virtual volume and a second virtual volume;

managing a configuration comprising a mapping of the first virtual local area network to the first virtual volume and the second virtual local area network to the second virtual volume ~~to form a configuration~~; and

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routing information from the first virtual local area network to the first virtual volume and the second virtual local area network to the second virtual volume and preventing communication from the first virtual local area network to the second virtual volume and from the second virtual local area network to the first virtual volume based upon the configuration; wherein the managing, routing and preventing is performed by the storage device.

11. (Original) The method of claim 10,

further comprising at least one of:

- configuring network parameters;
- configuring a new file system;
- configuring a designated file system; and
- deleting a designated file system.

12. (Original) The method of claim 10,

further comprising at least one of:

- updating a management interface IP address;
- updating a physical network interface IP address;
- updating a VLAN interface IP address and a VLAN tag;
- deleting a designated VLAN interface; and
- adding a new VLAN interface.

13. (Original) The method of claim 10,

further comprising at least one of:

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adding a VLAN to a file system;
removing a VLAN from the file system;
adding a volume to the file system; and
removing a volume from the file system.

14. (*Original*) The method of claim 10,

further comprising:

authenticating user authority.

15. (*Currently Amended*) A computer program product, comprising:

code for sending and receiving tagged frames to and from a network interface;
code for managing a file system accessible over a network by at least one network entity;
code for managing a virtual volume within the file system;
code for controlling data transfer between the network interface and a storage controller
of the file system;

code for managing a configuration comprising a mapping of the virtual volume to a
virtual local area network;

code for routing information from [[a]] the virtual local area network to [[a]] the virtual
volume in the file system and preventing communication from at least one other virtual local
area network to the virtual volume based upon a configuration; and

a computer readable storage medium for holding the codes, wherein the managing of the
configuration, routing and preventing are performed by a storage device hosting the file system.

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16. (Original) The computer program product of claim 15,
further comprising at least one of:
- code for receiving configuration information for the file system;
 - code for receiving configuration information for the virtual volume; and
 - code for receiving configuration information for the virtual local area network.
17. (Original) The computer program product of claim 16,
further comprising at least one of:
- code for updating configuration information for the file system;
 - code for updating configuration information for the virtual volume; and
 - code for updating configuration information for the virtual local area network.
18. (Currently Amended) A ~~computer network storage~~ apparatus, comprising:
a means for processing information;
a means for connecting to a virtual local area network (VLAN) switch;
wherein the means for processing and the means for connecting to a virtual local area
network (VLAN) switch are connectable to a ~~an external~~ storage device accessible over a
network by at least one network entity having at least one virtual volume mapped to at least one
segment of a virtual local area network (VLAN) based upon configuration information managed
by the processing means, thereby preventing communication between another segment of
another VLAN and the at least one virtual volume.

19. (Currently Amended) A storage apparatus, comprising:

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a means for processing information;

a means for storing data accessible over a network by at least one network entity;

a means for controlling storing of data;

a means for connecting to a virtual local area network (VLAN) switch;

wherein the means for processing, the means for controlling storing of information and the means for connecting to a virtual local area network (VLAN) switch map at least one segment of a virtual local area network (VLAN) to at least one virtual volume of the means for storing data based upon configuration information and prevent communication between another segment of another VLAN and the at least one virtual volume.

20. *(Currently Amended)* A system, comprising:

a storage device;

a virtual local area network (VLAN) switch, coupled to the storage device such that the storage device is accessible over a network by at least one network entity; and

at least one segment coupled to the virtual local area network (VLAN) switch via at least one virtual local area network;

wherein the storage device is operable to ~~control the virtual local area network (VLAN) switch~~ to map the at least one segment of the at least one virtual local area network to at least one virtual volume of the storage device based upon configuration information, and is operable to prevent another segment of another VLAN from communicating with the at least one virtual volume of the storage device.

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21. *(Currently Amended)* A method of controlling accesses from servers ~~[[at]]~~ to a ~~[[disk]]~~ network storage subsystem, wherein the ~~[[disk]]~~ network storage subsystem is connected to a virtual local area network (VLAN) switch via a VLAN ~~trunk switch~~ and receives access requests from the servers via the VLAN switch ~~and the VLAN trunk~~, the method comprising the steps of:

allocating a dedicated storage resource accessible over a network by at least one network entity to each VLAN segment,

receiving a Internet Protocol (IP) packet based access from a server,

determining a VLAN segment that the server belongs to, based on a VLAN identification in the IP packet, and

permitting the server to access the dedicated storage resource allocated to the VLAN segment that the server belongs to, and preventing another server that does not belong to the VLAN segment from accessing the dedicated storage resource based on configuration information managed by the network storage subsystem;

wherein the determining, permitting and preventing are performed by the network storage subsystem.

22. *(Currently Amended)* A method, comprising:

separating a virtual LAN into a plurality of segments;

managing a mapping of each one of the plurality of segments to a storage device accessible over a network by at least one network entity; [[and]]

assigning at least one virtual volume to each one of the plurality of segments; and

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controlling access to a virtual volume, such that ~~[[a]]~~ the virtual volume will
communicate only with a segment to which it is assigned; wherein the managing and controlling
is performed by the storage device.